

Notice of Allowability

Application No.

09/804,756

Examiner

Nihir Patel

Applicant(s)

EESLEY ET AL.

Art Unit

3743

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☐ This communication is responsive to 02.25.2004.
2. ☒ The allowed claim(s) is/are 2-7 and 21-29.
3. ☒ The drawings filed on 05.03.2001 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

Henry Bennett
Supervisory Patent Examiner
Group 3700

DETAILED ACTION***Examiner's Amendment***

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

The application has been amended as follows:

Claim 2 will be renumbered as claim 15

Claim 15 A heat sink of claim 22 wherein said fins and said foam blocks are connected to one surface of said heat spreader plate.

Reason for Allowance

The following is an examiner's statement of reasons for allowance: Claims 2 through 7 and 21 through 29 (re-numbered claims 1 through 15) of application number 09/804756 are allowable over the prior art of record in that the heat sink for electrical or electronic components comprises a heat spreader plate to which the components to be cooled are connected; at least two heat conducting fins that are positioned substantially parallel to one another and which are connected substantially perpendicular to the heat spreader plate; at least one foam block that is disposed in the space between parallel fins wherein the block is formed of reticulated foam to define a highly porous, heat conducting, open-celled structure that permits a cooling fluid to flow through the block as the cooling fluid passes across the fins; and the at least one foam block being made from aluminum, copper, graphite, or aluminum-nitride ceramic

wherein the fin height, **b**, is determined by the relationship,

$$b = 0.6498 \sqrt{\frac{k_f \delta_f}{h}}$$

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where,

k_f is the thermal conductivity of the selected fin material, Btu/ft s °F

δ_f is the fin thickness, ft

h is the convective heat transfer coefficient for the foam-filled space bounded by said fins and said heat spreader plate, Btu/ft² s °F, and where h is given by the formula,

$$h = 1.2704 \left[\frac{n^{0.50}}{(1 - \phi)^{0.25}} \right] \left(\frac{\rho^{0.50} k^{0.63} c_p^{0.37}}{\mu^{0.13}} \right) u_m^{0.50}$$

where.

n is the linear density of said at least one foam block, pores per ft

ϕ is the porosity of said at least one foam block, expressed as a fraction

ρ is the density of the cooling fluid that passes across said fins, lb_m/ft³

k is the thermal conductivity of the cooling fluid, Btu/ft s °F

c_p is the isobaric specific heat of the cooling fluid Btu/lb_m °F

μ is the dynamic viscosity of the cooling fluid lb_m/ft s

u_m is the mean velocity of the cooling fluid, ft/s

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

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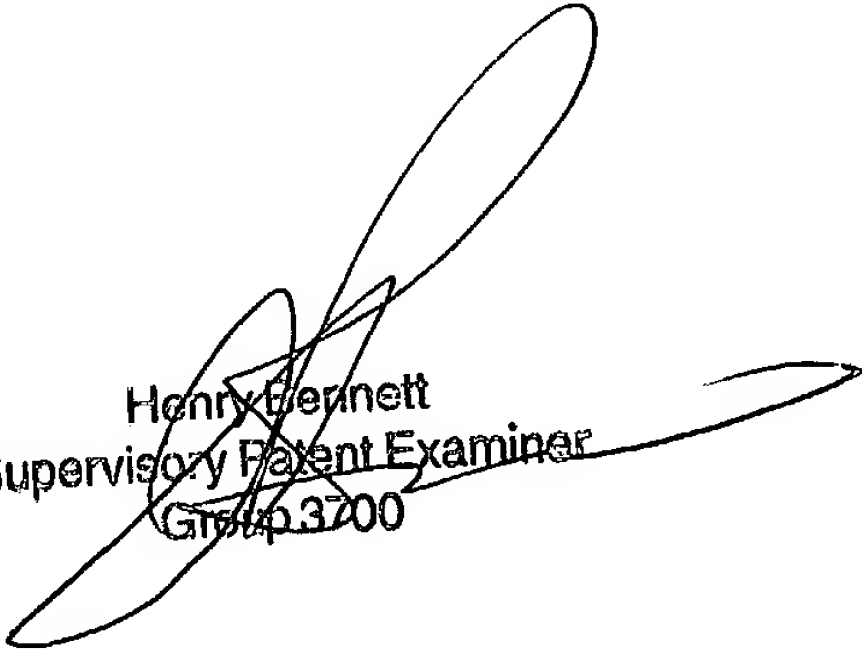
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nihir Patel whose telephone number is (703) 306-3463. The examiner can normally be reached on 7:30 to 4:30 every other Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Henry Bennett can be reached on 703-308-0101. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

NP

August 11th, 2004



Henry Bennett
Supervisory Patent Examiner
Group 3700